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These experiments, however, were not confined to an individual or even to a single group of individuals. Similar experiments were made on other professional men, on student athletes in training, and on soldiers under military regimen. The nitrogen in the urine was determined daily in twenty-six individuals for periods extending from five to nine months.

Summarizing the results obtained in all these groups of individuals, it is established that a diet containing about fifty grams of proteid (8 grams of nitrogen) is able to maintain the adult body machine in perfect repair.

The professional group alleged a greater keenness for its work, the athletic group won championships in games, and the soldiers maintained perfect health and strength, many professing repugnance to meat when allowed it after five months of practical abstinence.

Although it is possible that the alleged improved mental condition may have been due to mental suggestion, still the fact remains that it has been absolutely proven by Chittenden's work that the allowance of proteid necessary for continued health and strength may be reduced for many months to one half or less what the habit of appetite suggests.

The reviewer would, however, remark that it still remains to be proven that the fifty grams of proteid in the diet—which is not greater than the body would metabolize in starvation—is advisable as a program for the whole of one's adult life. It may also be that more than this quantity is indicated, during convalescence from wasting disease, or during the muscular hypertrophy which accompanies preliminary training for muscular effort.

The reviewer believes that Professor Chittenden has fallen into error in the commendation of 2,500 to 2,600 calories as an ample energy content for the diet of a soldier at drill. Accurate information on this point is only obtainable through respiration experiments. Chittenden, pursuing a sedentary life, prescribes 2,000 calories for himself or 35 calories per kilogram of body weight, while Mendel requires 2,448 calories or 35.3 calories per kilogram. These are entirely normal values for people at light work. In the earliest

calculations of Voit in 1866 it was shown that a man of 70 kilograms on a medium mixed diet produced 2,400 calories, or 34.3 calories per kilogram. Rubner allows 2,445 calories to men of 70 kilograms weight engaged in occupations involving light muscular work, men such as writers, draughtsmen, tailors, physicians, etc.

But the soldiers under Chittenden exercised for two hours in the gymnasium, then apparently drilled for one hour, and walked for another hour. This physical work can only be accomplished at the expense of increased metabolism. Zuntz has shown that to walk 2.7 miles in one hour along a level road requires an extra metabolism equivalent to the liberation of 159.2 calories in a well-trained man weighing 70 kilograms. If a soldier during four hours of exercise actually accomplished the equivalent of work of a walk of ten miles over and above what Professor Mendel accomplished in his laboratory, then the metabolism of the soldier would be larger than Professor Mendel's by 637 calories ( $159.2 \times 4$ ) or he would have had a total metabolism of 3,085 calories ( $2,448 + 637$ ). This does not seem an improbable amount.

For ordinary laborers working eight to ten hours a day, such as mechanics, porters, joiners, soldiers in garrison and farmers, 3,000 calories, as advocated by Voit, is apparently not too great. Rubner's diet for the same class calls for 2,868 calories. Chittenden's allowance of 2,500–2,600 seems to the writer too small, while Atwater's of 3,400 appears excessive.

Unstinted praise for painstaking endeavor and unremitting toil belongs to the workers who have achieved this volume. It is a monument of fidelity and an inspiration to thoroughness in scientific work.

GRAHAM LUSK.

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*The Insulation of Electric Machines.* TURNER and HOBART. Pp. vi + 297. 146 illustrations. New York, The Macmillan Company. 1905. Price, \$4.50.

It is a difficult and tedious task to write a

book upon a subject which is in the empirical stage of its history, yet in this volume the authors have succeeded in producing a work which is rich in useful information, and which the electric constructor will find a valuable addition to his library. From a scientific standpoint perhaps the most interesting portion of the book is the second chapter, which summarizes very effectively the present state of knowledge regarding the dielectric strength of various materials under various conditions. Nothing is more convincing evidence of the need of further investigating the passage of electricity through gases than the discordant values obtained by different experimenters for the dielectric strength of air.

The constructor will find the chapters on field and on armature insulation and on the 'space factor' exceedingly practical and suggestive, and indeed wherever the authors have had the opportunity of drawing upon their own valuable experience and exercising untrammelled their nice discrimination the results are very satisfactory. Unhappily, insulation at present must rank as crude art rather than as science, and art, too, somewhat luridly colored by commercial daubers.

Of patented insulating preparations and secret compounds the name is legion, and good, bad and indifferent, all alike make the most extravagant claims, and back them up by experiments. These compounds can not be left without mention in a book on insulation, for some of them are highly meritorious, but proper and adequate treatment of them is a practical impossibility. In dealing with this part of their subject therefore, the authors can hardly do more than supplement the alleged facts by such data as are available and to let the matter go at that. They have at least avoided the error of assuming commercial data to be altogether reliable by giving several points of view on disputed topics. The chapters treating of oil insulation fortunately escape such difficulties, paraffin and other oils being free from patents and trade marks, and these will well repay study.

The facility with which oils, spite of the old saying that oil and water will not mix, take up moisture enough to ruin their insulating prop-

erties will surprise the non-technical reader and suggests an interesting and useful field of research.

As a bit of friendly criticism it should be suggested that in the next edition most of the experimental curves given should be remade by the wax process, in the interest of neatness and easy reference. A very useful bibliography of the subject is a valuable feature of the book, and the index is satisfactorily full. Altogether Turner and Hobart have done a commendable piece of work and one that will be widely appreciated.

LOUIS BELL.

BOSTON.

*Grundriss der Soziologie.* By LUDWIG GUM-  
PLOWICZ. Second edition, revised and en-  
larged. Vienna, 1905.

Sociologists in this country will be interested in this new edition of Doctor Gumpłowicz's famous work. In the preface he calls attention to the rapid development of sociological study during the last twenty years, in which development he modestly hints that his 'Grundriss' might well assert, *Quorum pars magna fui*.

The text of the first edition is preserved intact, with slight verbal changes here and there. The chief modifications consist in additions, reference notes and quotations from later works. In book one, for instance, the history of sociology is brought down to date. Special attention is given in this to the views of Ratzenhofer, whose untimely death while homeward bound from the congress at St. Louis, deprived sociology of one of its foremost writers. Ratzenhofer's 'Positive Ethik' is extensively quoted from in book four, pages 330-336. Discussions of 'Methode der Soziologie,' and 'Geschichtsphilosophische Konstruktionen,' complete the list of important additions.

This last discussion should be read in connection with his article in *American Journal of Sociology*, March, 1905, entitled 'An Austrian Appreciation of Lester F. Ward.' Dr. Gumpłowicz frankly admits that he is not yet prepared to believe in the possibility of an 'applied sociology,' but, while still holding to